THE OZPAC RADIO NET

AUSTRALIAN PACKETEER

SYDNEY AMATEUR DIGITAL COMMUNICATIONS GROUP

VOLUME 1 ISSUE 2 NOVEMBER 1983

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Future issues of this newsletter will be available electronically. A contributers file will be opened on the host computer and the resultant copy available for down-loading as a file 'PKTEER.TXT'.

The Sydney Amateur Digital Communications Group is a voluntary, non-profit organization whose objectives are the advancement of packet data communications techniques within amateur radio.

Acting interim Board consists of President - Jim Swetlikoe VK2BVD
Vice-Pres - John Tanner VK2ZXQ
Secretary/Treasurer - David Pilley VK2AYD
Technical Committee - VK2KFJ, VK2ZRQ, VK2ZJO, VK2AQG , VK2ZAZ

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THE AUSTRALIAN PACKETEER

SADCG

Volume 1 Issue 2 October 1983

Editorial

G'day! Amazing how quickly four months zip by. We were pleased by the response to the initial newsletter and exerpts carried in 'AR' and 'Your Computer' magazines.

Telephone calls and inquiries were received from a number of capital cities, including Perth. This period has been quite busy for us all and apologies go to those awaiting this newsletter.

Key activities over this period were further involvment with Amateur Satellites: the launch, initial testing and trials on Oscar-10. Mid-August saw successful 2-way packet contacts with New Zealand on 20 metre SSB using standard TNC's and 1200 baud modems. Assistance to new members continued and nine more stations are underway, with five already on the air. A number of stations now have UHF-FM capability and 438.875 MHZ has been selected for packet liason tests.

Overseas, packet activities continue on many fronts. Full summaries of VADCG and TAPR group reports follow. In addition details of the engineering reports for the proposed PACSAT satellite, as well as UOSAT-9B are included.

Welcome to the following new stations on 147.60 MHZ:

VK2AYD	DAVID PILLEY	BELROSE
VK2AQG	PAUL HUNTINGDON	LIDCOMBE
VK2ZAZ	GEOFF RADCLIFFE	KINGS PARK
VK2YME	DAVID SCOTT	WEST PENNANT HILLS/ARTARMON

And, I did see VK2BOA on my screen several days ago. Tony is using the software emulation of W4UCH on a TRS-80 in Newcastle. We're impressed that you got into the DR from there! VK2ZJO reports that the digital repeater is heard reasonably well in Forster.

NEWS

Sydney Scene

1. Host CP/M computer - VK2ZXQ

This facility has proven to be extremely useful - both for messages and for program execution and exchange. As the TNC software is 8085A/CPM-based and development continues, transfer of updates (and even this newsletter!) may be shifted to a system such as this.

For those who don't use a CP/M-based operating system, access to this system has opened up a whole new world of public domain computing and indirect communication with others of common interest. It's amazing to see messages left by people from Finland and the UK as well as from the "regulars".

A very convenient program module is "ORBIT". This is the DR. TOM CLARK - AMSAT US Satellite orbit calculation program. This program is a recent version and will calculate orbital parameters for 10 different amateur satellites. In addition, an

enhancement allows entry of the geographical co-ordinates of your station and any other printout of the time windows between the two stations. Parameters output include azimuth, elevation, range, doppler shift and times.

Program access is limited to amateurs via a password at this time. Direct inquiries to VK2ZXQ, XAD, BVD or the SYSOP.

Construction of Host TNC/Modem/radio

Few of us have realized that for the last six months, Peter, VK2XAD, has graciously loaned his TNC/modem and multimode FM transceiver to keep the RCPM active.

We have realized the value of this resource and intend to keep it on-line. We'd also like to thank peter for his great patience in providing his equipment. Good on you, mate!

Commencing at the end of this month, a 480 rack mount replacement is being readied. The TNC and modem have been tested and only the mechanical work radio and power supply are left to complete. This interface and the DR TNC/modem will become SADCG hardware.

2. Digital Repeater - VK2ZRQ Berowra

The digital regenerator (D.R.) was placed into service in May and consists of a simplex commercial continuous-duty VHF radio, a TNC configured for repeater use, and an AFSK radio modem. This facility continues to provide excellent service even to stations in poor VHF locations.

Recently, a trend to deafness has developed. This problem has been investigated on several occasions. Initially, the modem was suspected of being susceptible to power line interference from adjacent high voltage circuits. The modem was replaced and access improved for a short time. After further consideration and discussions with John, VE3DVV, it now appears that toggling of the DCD line by audio input noise at the modem can put the 8273 HDLC controller chip into an illegal 'no response' state. This is easily cleared by a hardware reset of the TNC.

The repeater software has been modified by John to the RPT14 version which now provides a routine reset to the 8273 as an interim solution. This program will be down-loaded shortly and should be mounted prior to Christmas. A 'clean' solution may require modem audio filtering and DCD line conditioning as well.

Page 3 provides a summary of repeater Level 1 and Level 2 commands. The LOGON and LOGOFF commands are particularily useful if you wish to bypass the DR and not have everything echoed. Remember that a user is automatically logged on to the repeater by his first transmission!

A 'DUMP' of the CCA (common communications area) is a valuable debugging tool and also serves as a quality indicator of the RF path from the repeater. The 'DUMP' command sends successive packets until the buffer end is reached. ACKS are not expected. However, the packets received by the user are checked for corruption. Any Frame Check Sequence errors prevent the received packet from being transferred to your VDU screen. Since each line is a memory address, any missing addresses will identify rejected packets.

REPEATER PROGRAM RPT13

By John C. Vanden Berg,* VE3DVV

(Editor's notes - This article describes the features of the repeater program in use in the Toronto/Hamilton area as well as in the Sydney, Australia area and soon to be operational in other areas. John, VE3DVV is presently working on a new version of this program called 'RPT14' which is in the final testing phase at the present time. The program runs in a VADCG TNC board with the modifications described in another article in this newsletter. This version has given us good service for many months now.)

LAST CHANGED: FEB. 5 1983 (PROGRAMMABLE CTS DELAY)

THIS PROGRAM IS DESIGNED TO RUN IN THE VADCG TERMINAL NODE CONTROLLER. IT DRIVES AN INTEL 8273 HDLC/SDLC PROTOCOL CONTROL CHIP USING INTERRUPTS AND RUNS IN ROM MEMORY. ITS PURPOSE IS TO ECHO ANY FRAME IT RECEIVES CORRECTLY.
THE PROGRAM IS AN EXPANDED VERSION OF VE7APU'S ECHO PROGRAM

THE FOLLOWING ADDITIONS WERE MADE :

1. The default address range it repeats is 60H to FFH.
2. A TOD (time of day) clock has been added.
3. A Julian date calender was added.
4. Three levels of commands have been added :
   level 1. Public
(any station within range using LIPTT protocol)
   level 2. Selected
(any station using control address 88 hex)
   level 3. Operator commands
(selected stations, such as licencee)
5. Repeater failure detection and error handler. (software detected failures are saved and recovered if possible)
6. Error logging. (software detected failures are counted, time and day of last failure saved)
7. Software hooks.
(to allow downloaded code using local interface to be added for further program development.)
8. Downloader/trap program.
(a separate program " RPTRAM.ASM " resident in top of eprom for downloading and debugging)

COMMAND DETAILS :

LEVEL 1 COMMANDS

TIME
; displays current time and message
LOG
; shows log status
LOGON
; station logon request
LOGOFF
; station logoff request
LOG :
; shows log status and cts delay
LOGON :XXX
; logon station and set cts delay

LEVEL 2 COMMANDS

STATUS :
; display current repeater status, such as repeater enabled/disabled, failures etc.
CLEAR :
; clears cca and tx/rx buffer
SAVE :
; save current environment (CCA and buffers)
DUMP :
; dump CCA and buffers

NOTE : a higher level command also includes all lower level commands.

SHORT SUMMARY :

This repeater allows selected repeats as requested by the packet user (LOGON cr, cr, LOGOFF cr, cr) commands. The turnaround time of the repeater for each address is programmable by the user (Example: LOGON :120 cr cr). The programmable repeater CTS delay ranges from 0 to 630 msecs. A too-short delay will result in missed packets, and too long a delay results in slow throughput.

Anyone who would like to study the format of the actual packets,can change his TNC address to 88 hex and use the " SAVE : " and " DUMP : ",commands to look at the packets as received by the repeater. The " CLEAR : ",command effectively resets the repeater and clears the buffers.

The actual buffer starts at 1070 hex in memory. Below this is the stack pointer and the common communications area (CCA) command to 1800 -1BFF so it can be transmitted by the " DUMP : " command. In other words subtract 800 hex for the real address.

The repeater can be controlled by two control stations. Either station can reset the repeater, turn the repeater on/off remotely, set time of day, Julian date, change 5 min. interval message, dump any part of memory, check for errors, do traps and initialize the user table.

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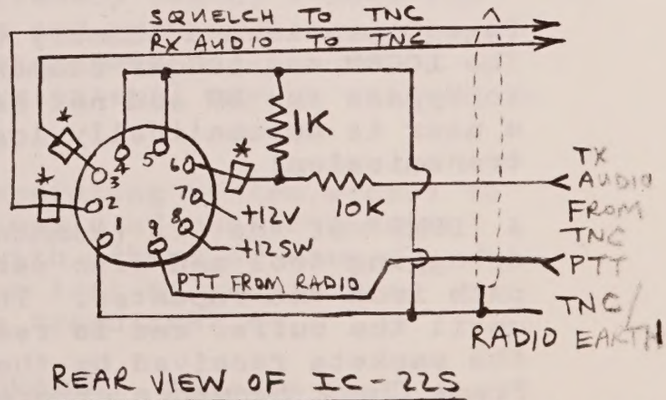
STANDARDIZED RADIO CONNECTIONS



REAR VIEW OF IC-22S
AUXILIARY CONNECTOR : VK2BVD

* OPTIONAL FERRITE BEADS

SATELLITE REPORT - Packet Radio in Outer Space !!

*** 1. UOSAT-9B:

As you already know, the latest UOSAT-9 1200 baud ASCII Bulletins are loaded onto the host computer by VK2AQG and VK2ZAZ. This file is named "SATELLITE" and is a wealth of information in this fast-moving area. A typical bulletin is usually 3 or 4 pages long!

The good news is that the UOSAT team has been given an unexpected launch of a second spacecraft : UOSAT-9B sometime after 1 March 1984.

"A store-and-forward digital communications experiment using packet transmission techniques will be included to demonstrate the feasibility of, and to study the characteristics of a global PACSAT communications network based on simple low-cost radio amateur stations."

"Each radio amateur station will be able to load data/messages into an on-board 96Kbyte CMOS memory controlled by the satellite packet controller. The user may also retrieve messages that may have been left for him. Communications modes will be simple 300, 1200, or 9600 bits per second AFSK, FM, or PSK techniques with low transmit power and relatively simple receiving facilities. Experience gained will be invaluable in planning a future comprehensive packet communications spacecraft : PACSAT."

*** 2. PACSAT Status:

The AMSAT organization has thrown its support behind the concept of a packet communications satellite. The following comments are exerpted from the "Program Manager's" Report to the Pacsat Team "- June 19, 1983" and from "Pacsat Design Document - Draft Format (20 June 1983)" courtesy of ZL1AOX:

The first document by DEN, KD2S is interesting reading for background on how to organize a satellite project and for general objectives for the packet communications experiments.

The second document provides functional descriptions of the packet experiment, ground stations, the satellite itself, and launch vehicles. The Design Environment is described and funding requirements are listed.

The objectives are to provide multiple 438MHZ uplinks with 1200/9600 bits-per-second data rates and dual downlinks with 1200/9600 band capability. The messaging capability will include 2 megabytes of RAMUNIT in two one-megabyte packages. Memory resources to be shareable and protocols to be uploadable for service reconfigurations as usage warrants.

Three regional and twelve remote PACSAT ground stations will be provided as part of the satellite package.

Continuing details of the PACSAT project are summarized on AMSAT-Australia net and in the column in 'AR'.

Anyone interested in a copy of the abovementioned documents may obtain same for an SASE.

VADCG/HAPN News:

The long awaited Issue 8 of "The Packet" newsletter arrived recently from the Vancouver Amateur Digital Communications Group. This issue was a joint newsletter with the Hamilton & Area Packet Network which produces "I-Frame de VE3PKT".

Following a re-organization, the VADCG shifted its operations to Toronto where Doug Lockhart, VE7APU, took over TNC kit provision and correspondence. In Vancouver, John Spraggs VE7ADE continues as President. Don Oliver, VE7AOG, long-standing Secretary/Treasurer has retired. These duties are being assumed by Doug VE7APU when he returns to Vancouver in November after two years in Toronto.

With the large group in the Toronto/Hamilton area, the work load is much more diverse. A considerable amount of software development is taking place and Doug is attempting to co-ordinate and catalogue all TNC software. This effort will be available in the near future on CP/M 8" SSSD diskettes.

An ambitious repeater linking project is being organized by the Hamilton group, spearheaded by John Vandenburg, VE3DVV. This project presently has linked the Hamilton packet repeater to a second site east of Toronto. This repeater will link to an existing digital repeater located near Rochester, N.Y. From this site, a further repeater linkage through to New York is proposed. Sites have been selected at Erin Mills, Ont., Bowmanville, Ont., Newark. N.Y., Syracuse, N.Y., Ilion N.Y. Schenectady, N.Y. and Hudson, N.Y.

We will be following the progress of this system with keen interest. More details follow in an exerpt from their newsletter.

Latest addresses of the above packet groups are:

1. VADCG
   9531 Odlin Road
   Richmond, B.C.
   Canada V6X 1E1

   Secretary/Treasurer
   Doug Lockhart VE7APU

2. H.A.P.N.
   8 Forestgate Drive
   Hamilton, Ontario
   Canada L9C 6A3

   Secretary
   Ron Hands VE3SP

3. Rochester Packet Group
   C/o Ray Williams WA2RYT
   305 Barry Road
   Rochester N.Y. 14617 USA

TAPR News:

The Tucson Amateur Packet Radio Corporation (TAPR) is the main amateur packet communications organization in the U.S. From a start of 6 Tucsonans in November 1981, this organization as of August 1983 has 450 members in all parts of the U.S. and the world.

Lyle Johnson, WA7GXD is President and also is involved on the Board of AMSAT-US. The SADCG receives copies of their monthly newsletter and will continue to keep local members informed of this major group's activities.

The TAPR group designed a new TNC following their initial formation. This board is well-described in articles in "Ham Radio" magazine July/August 1983 by KV7B and KV7D. The September/October/November issues of "73" magazine carry a series by Lyle Johnson on packet radio.

The new TNC is 6809-based and includes a 202-type modem on the controller board. With substantially more memory on board, the software was split into two areas: Low-level routines performing real-time servicing and High-level applications software written in Pascal targetted for the 6809. A good description is given in the 'HR' articles.

The initial TNC distribution occurred in the Beta test of late last year where 170 boards were distributed to various packet groups in the U.S. The hardware and software experience of this test was then incorporated in the production board. Two prototype kits were constructed in August 1983 and a final prototype completed at the end of September this year.

TAPR expects to ship first test kits in mid to late October. We're amazed at the size of the kit project, particularly for a non-profit volunteer organization! Their backlog is 300 kits and they expect to distribute a hundred kits per month during December/January 1984. Typically, the order lead time is 3 months or longer at this time. Congratulations are in order for completing a project of this magnitude and we wish them every success in the future.

The TAPR group is fundamentally an R & D organization whose objectives are to put packet communications into the amateur's hands, educate users on the potential of data communications, and to encourage further development of this mode.

TAPR boards have an extensive keyboard command structure which enables the user to switch from AX.25 protocol to VADCG, to invoke trace utilities, and to perform a considerable amount of debugging with TNC processor assistance. This computer also allows any TNC to double as a digital repeater if so requested under AX.25 protocol. Thus, even if your TNC is already "connected" to another station, a re-transmission request from a third party can be serviced in the idle time of the processor. The flexibility of this approach leads to a complete distributed network where conventionally-sited digital repeaters no longer are as important. (However, I don't think we'll ever lose the need for wide-access digital repeaters since the distributed network relys on each individual user keeping his station available at all times, sometimes an impossible task.)

TAPR runs an information net on HF on the following frequencies:
21.280 or 14.235 MHZ at 1900 Z Sundays

TNC Availability:

*1. VADCG has nominated the SADCG as Australian coordinators for VADCG TNC boards and for configuring the appropriate software. As SADCG is also a non-profit volunteer organization, prices follow VADCG costs plus a small surcharge to cover mailing and bank /currency charges.

The current prices* are:

$CAN	$US	
199	169	for assembled and tested TNC. (Does not include power supply or cabinet.)
157	136	for complete TNC Kit for serial (RS232) connection. Includes PC board, all 8K of memory, all components are socketed. (Does not include power supply or cabinet.)
135	117	for same as above less PC board
22	19.95	for TNC bare PC board only
15	15	202-type 1200 Baud modem bare PC board only.
80	70	for 202-type 1200 Baud modem assembled and tested.
50	44	for Intel 8273 chip

* Shipped postpaid in the U.S. and Canada

Contact SADCG for ordering information.

*2. TAPR TNC's:

These TNC's are available from the Tucson Amateur Packet Radio Corporation. Orders are handled in the order in which they are received with TAPR members having a degree of priority.

Contact: Tucson Amateur Packet Radio Corporation
P. O. Box 22888
Tucson, Arizona 85734-2888 U.S.A.

including your name, shipping address, etc., along with a deposit of $U.S.25.00. This will place you into the queue and you will be advised of the shipping date. Balance of payment is due one week prior to shipment.

The present price of the complete kit is $U.S.247.00 which includes shipping and handling.

MODEM INVESTIGATIONS:

Following the problems that plagued VK2AYD and experience with the D.R., further investigations with modems have been undertaken by VK2ZXQ, VK2AQG, VK2ZAZ, and others. A 202-equivalent modem was bread-boarded using an AMD 7910 1200 baud modem chip. This device performed as well as the SADCG modem board and may be used in future boards. An attractive option is the capability to switch to CCITT frequencies and access the various RCPM systems around the country.

Difficulties in setting the present AFSK modems exactly on frequency when using SSB became very evident in the tests performed with ZL1AOX in Auckland last August and also in local 10 metre tests between VK2AYD and VK2BVD. We have noticed that both the UOSAT and AMSAT groups are looking at other modulation techniques for future satellite packet facilities. PSK and MSK have been proposed and evaluations are underway. In the U.S., the AMRAD group are looking at various HF modem approaches also.

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PACKET RADIO ACTIVITY IN THE HAMILTON-TORONTO AREA

Since many of those readers on the VADCG mailing list may not have heard of the Hamilton and Area Packet Network or of the Amateur Packet Radio activities in the Toronto area I will give a little background information about the area and the organisation. I have been living in Toronto for almost two years now.

Toronto and Hamilton are located on the northwest shore of Lake Ontario about 60 miles apart and are within two metre range of each other as well as Buffalo, New York. Interest in Packet Radio took hold in the area in the fall of 1979 after a talk on the subject by yours truly at a meeting of the Hamilton Amateur Radio Club. Prior to the talk there had been some communication with the Vancouver Amateur Digital Communications Group. Some of the pioneers of this mode of communication in that period were John Vandenberg - VE3DVV, Glenn Simpson - VE3DSP, Max Pizzolato - VE3DNM, Stewart Beal - VE3MWM and others.

In 1980 Stewart Beal organised the Hamilton and Area Packet Network and almost single-handedly published a series of very informative newsletters mostly distributed locally.

In the intervening years, interest in packet radio increased and now the small group in the Hamilton area has expanded to include Toronto, the area between Toronto and Hamilton and other areas in southern Ontario. The numbers of active 'packeteers' in the area has grown to about 50 who can and do go on the air regularly on packet. There are at least as many more who are in some stage of getting something on the air. To my knowledge, this is the largest group of active 'packeteers' anywhere.

In spite of distance, there has been a continuous history of communication and cooperation with the VADCG during the development of packet radio in this area so it is not surprising that the two groups put out this combined newsletter. All the activity in this area involves the use of the VADCG TNC and the 'Vancouver' protocol. There have been a number of unique and useful programs for the VADCG TNC developed in this area.

At the present time, the area has a digital repeater in operation and a second one under construction which when completed will provide a link to a third repeater located in Rochester, New York. There is also a remote CP/M system and RBBS operating on the local network. There is also development work going on in this area. Individuals in this area are developing techniques to use the special service channels on Oscar 10, protocols for multiple links, a high speed packet radio, higher level protocols, intelligent repeaters and other projects. Only time will tell which of these projects will yield significant results.

There is a weekly packet radio net on one of the local 'analog' repeaters. Two simplex channels - 145.65 MHz. and 146.46 MHz. are used almost exclusively for packet radio communications but there is sometimes so much activity on 145.65 that it is necessary to use a second frequency for packet. The Toronto-Hamilton group may not be high-profile but it is certainly one of the largest and most active packet radio groups.

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TNC ADDRESS ASSIGNMENTS IN THE SYDNEY AREA

CALL	TNC HEX ADR	NAME	MODEM	TERM	RIG
VK2AQG	72	PAUL	SADCG, 7910	TRS-80	
VK2AXA	76	ALAN	"	"	
VK2AYD	70	DAVID	" ,7910	"	
VK2BVD	91	JIM	VADCG	PANASONIC	22S
VK2KFH	78	FRED	SADCG	APPLE II	
VK2KFJ	94	STEVE	VADCG	SY80+	22S
VK2XAD	7A	PETER	SADCG		
VK2YME	77	DAVID	"	H'WELL	
VK2ZAZ	75	GEOFF	" ,7910		
VK2ZIU	74	IAN	"	CD2650	
VK2ZJO	95	PETER	VADCG	TELERAY	FT-290R
VK2ZXQ	73	JOHN	" ,7910	S-100	
VK2ZLV	7B	BOB	"	OSBORNE	
VK2ZRQ	B9	ROSS	" ,7910	D.R.	
VK2ZWP	71	CHRIS	SADCG	APPLE	
VK2ZBB	79	GARY	"	S-100	
VK2KYJ	7C	LES	"		
VK2BCC	7E	COC	"		
VK2ZTN	7F	BOB	"		
VK2ZHN	7D	JOHN	7910		

Book Review: "Synchronous Packet Radio - The Software Approach: Volume I"
: Bob Richardson W4UCH
: Richcraft Company (NY)

Tony O'Brien VK2BOA dropped me a note in August pointing out that this book was now available locally. Author Bob Richardson has been involved with the Northern NY State packet groups and developed his software in conjunction with a number of Buffalo amateurs.

The 220 page book comes with a 35 track SSSD diskette containing the Z-80 assembly source code oriented to TRS-80 Model I or III computers. The book is the first part of a two volume series:

(i) Volume I covers the basicsof packet radio: a short background summary, the concept of SDLC/HDLC packets and takes the reader through the steps of synchronous data link control. This discussion outlines the VADCG and AX.25 protocols and shows how to install the assembled code into your computer.

(ii) Volume II presently under preparation outlines the Tucson/ ARRL/AX.25 protocol in more detail and provides a similar software emulation of the TAPR 6809 based Terminal Node Controller.

Since August, several SADCG members have acquired the program and have evaluated the performance against that of a VADCG TNC. The mounting of the package into a TRS-80 was straight-forward and didn't take very long to get up and running. It should be noted that, once the program is executing, your computer is limited in the tasks it can perform. Similarly, excessive local activity (i.e. file manipulation printing, etc.) may overload the I/O interrupt handler and possibly miss packets. For these reasons, the program should not be considered a replacement for a TNC.

The program will operate successfully in receive mode on a busy TDM packet channel or digital repeater. Further tests have yet to be concluded in full connect-mode transmit operation. The program, however, operates flawlessly for single point-to-point simplex data transfers or one-on-one packet QSO's and is valuable for that type of use.

In summary, this book is a good introduction to packet radio to those with TRS or Z80-based computers. It lets you get your feet wet for very little cost and allows one to evaluate his own requirements for a TNC.

(Available from Northern Digital, P.O. Box 333, Charlestown 2290)

□ VK2BVD

Terminal Node Controller Modifications

The V.A.D.C.G. TNC can easily be modified to accept 2716 EPROMs in place of 2708s and 6116 RAM in place of 2114s.

The memory decoder is modified to address 2K blocks, and address line A10 transferred to the memory chips. Supply voltages +12 and -5 are removed from U15 to U18 (-5 is no longer required). The current consumption of +5 & +12 is significantly reduced. Two 2716 EPROMS are installed in U15 & U16 and two 6116 in U17 & U18. U19 to U26 are not required.

All modifications are performed on the under side of the board.

Cut tracks to pins 1, 2 & 3 of U8 memory decoder.
Link the track formerly on pin 2 to pin 1 (A11).
Link the track formerly on pin 3 to pin 2 (A12).
Link pin 3 to pin 5 (0V).
Link the track formerly on pin 1 (A10) to pin 19 of U15.
Cut tracks to pins 19 & 21 of U18 (+12 & -5) on the right of the board.
Cut the track joining pin 21 of U16 to pin 21 of U17.
Link pin 21 of U15 to pin 24 (+5).
Link pin 21 of U18 to pin 31 of U1 (WR).

Note that issue A of the circuit listed A8 to A15 of U1 in the reverse order.

Ian Binnie VK2ZIU
7 Sept 1983

NOTE: Since this mod was issued, VK2AQG and VK2ZAZ report that pins 18 and 20 of the 6116's should be swapped to clear a timing problem.

Second ARRL Amateur Radio Computer Networking Conference

Coordinated by Hank Magnuski, KA6M and Paul Rinaldo, W4RI
March 19, 1983

A copy of the Conference Proceedings has been obtained and is proving to be a valuable technical resource for planning and compatibility of design.
Details will follow in future newsletters.
Copies may be obtained from the ARRL for $US9.00.

TNC ENGINEERING CHANGES

By Doug Lockhart,* VE7APU

Back in issue number 4 of "the packet" there was an article which described some useful changes that could be made on the VADCG TNC board to add additional function. Since then other modifications have been developed. What follows is a step by step procedure to modify the board to incorporate these changes. Many users of the board may not have seen the original changes in issue number 4 so it is appropriate to re-publish this information in this different form.

In the intervening period, these modifications have become much more important because a lot of useful software has been written relying on these changes. In fact, these modifications are so important that I would recommend them to anyone using the board. In a forthcoming issue of "the packet" we will be publishing listings of programs using these modifications.

The following engineering change adds the following hardware functions to the board:

1. A debounced pushbutton controlling the TRAP line on the 8085. This provides the opportunity to obtain accurate snapshot dumps of unusual conditions in the TNC hardware or software and allows downline loading of the TNC. The complete status of the board may be saved including register contents and the value of the program counter.
2. A pushbutton controlling the RESET line on the 8085. (Most users have already installed this feature.)
3. A status indicator LED which can be controlled by software running in the TNC.
4. A precise timing pulse generated from the AC mains frequency which can be read by the software in the TNC and can also be used to provide timed interrupts for use by a software time-of-day clock or interval timer for accurate time-outs and clear to send delay generation.

Note that these modifications use an area of the board that is normally used for components to support a 20 ma. current loop interface. If you are using the 20 ma. current loop interface then this engineering change will not fit on your board. You will have to design your own modifications to provide these new functions. If you have installed the components for the 20 ma. current loop interface but are not using it, then you should remove CR2, CR3, R17, R18 and Q1.

PARTS REQUIRED:

74LS00 or 7400 integrated circuit
14-pin DIP socket (solder tail)
12,000 Ohm 1/4 watt resistor
3.9 to 4.7 Volt Zener diode 1/2 watt
2N3904 NPN transistor (or equivalent)
LED with wire leads (any colour)
100 Ohm 1/4 watt resistor
2 normally open pushbuttons
About 5 feet of #30 or #28 wire-wrap wire

TOOLS AND MATERIALS REQUIRED:

Small soldering iron.

Wire stripper.

Exacto knife or equivalent to cut land patterns on the PC board.

A #60 or smaller diameter drill bit.

A small drill to hold above bit.

The original TNC 'Assembly Notes'.

Contact cement (optional).

PROCEDURE

Step 1.

Make four (4) cuts in the land pattern connections on the back of the board. A sharp knife or small grinding wheel is useful to break the land pattern. See figure 1 for the locations of these four cuts.

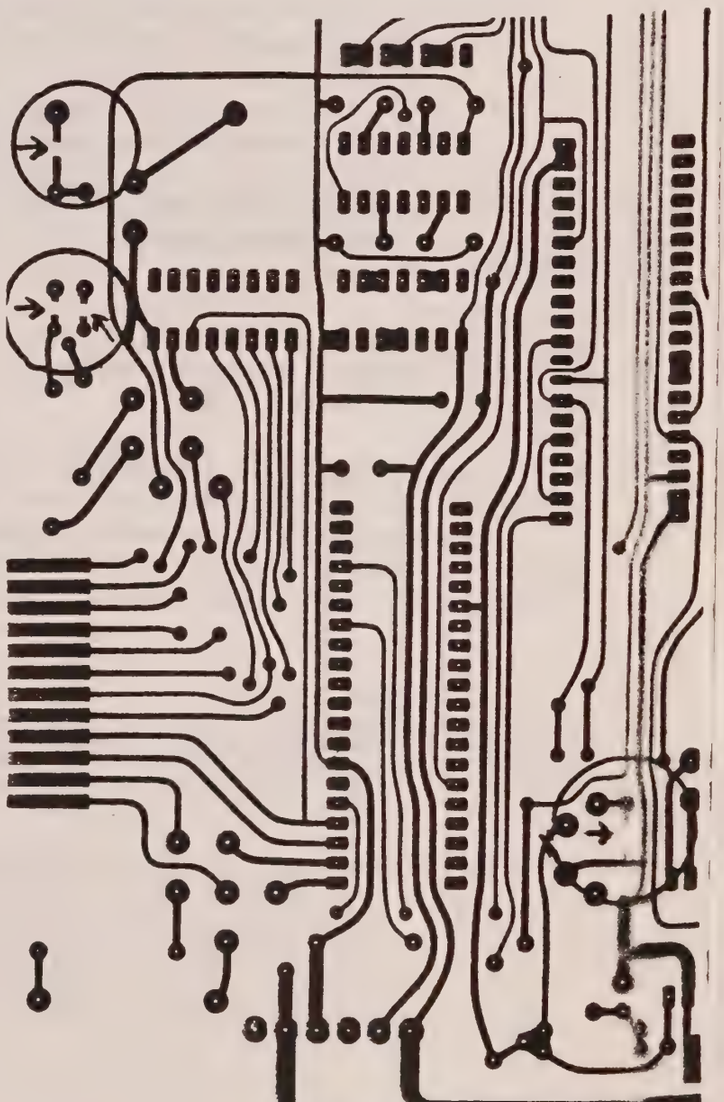


Figure 1. Part of back of PC board. Showing locations of land pattern cuts

Step 2.

Drill 14 holes for the DIP socket. It will be located in the bare area of the board just below socket J3 near the DB-25 modem connector. See pointer number 1 on figure 2 for proper position and orientation of the socket. It is easier to drill these holes if a jig is made up in advance from a scrap piece of pre-drilled PC board or if a stick on 1:1 label is used as a visual guide.

Step 3.

Drill 2 holes for the bypass capacitor just above the socket just installed. The holes should be spaced either .2 or .3 inches apart depending on the lead spacing of the capacitor being used. See pointer number 2 on figure 2 for positioning of these holes.

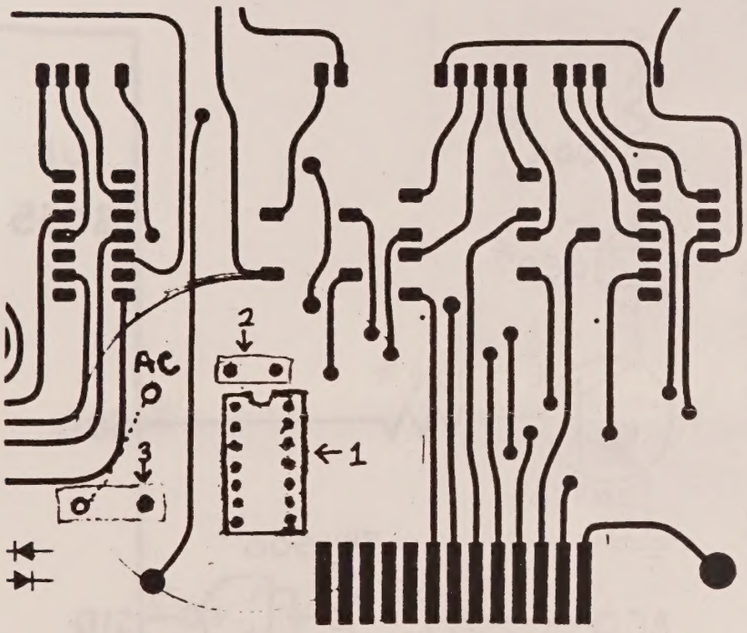


Figure 2. Part of top of PC board. Showing locations of holes to drill.

Step 4.

Drill one hole for the Zener diode to the left of the new IC socket. See pointer number 3 on figure 2 for the location of the hole to be drilled. The other lead of the Zener diode uses an existing hole on the board.

Step 5.

For this and following steps you will need to refer to the board layout sheet in the original documentation for the board to find the component positions. Install and solder the 2N3904 transistor in position Q1 on the board. The collector lead should go in the top hole. (furthest away from the board edge) The base lead goes in the middle hole and the emitter lead goes in the bottom hole (closest to the edge of the board). Do not trim the leads at this time.

Step 6.

Install and solder the 12,000 Ohm resistor in position R17.

Step 7.

Install and solder the 100 Ohm resistor in position CR2. Do not be concerned that this position was originally for a diode.

Step 8.

Install and solder the LED in position CR3 on the board. Ignore the markings on the board at this position. The cathode of the LED should be oriented towards Q1.

Step 9.

Bend the collector lead of the 2N3904 transistor over and solder it to the cathode lead of the LED. Trim all leads.

Step 10.

Install the 14 pin IC socket in the holes drilled in step 2 above. The socket may be glued in place with contact cement. Pin 1 should be positioned furthest from the board edge.

Step 11.

Install the .1 mfd capacitor in the holes drilled in step 3 above. One lead should be bent over and wrapped around pin 14 of the IC socket (5 Volt level) and soldered. Bend the other lead over and solder it to the land pattern running just above the capacitor. This is a ground line. Trim excess lead length.

Step 12.

Install the Zener diode in the holes in area 3 of figure 2. The anode lead should be put through the right hand hole and bent over to connect with the ground land on the back of the board. The cathode lead is soldered in the already existing hole.

Step 13.

Using the wire wrap wire make connections between the following points on the newly installed socket.
a. Pin 1 and Pin 6.
b. Pins 3, 4 and 5.
c. Pins 9, 10 and 11.
d. Pin 12 and pin 13.

Step 14.

Using the wire wrap wire make connections between the new socket and other points on the board.

a. Pin 14 of the new socket and pin 40 of U3.

b. Pin 14 of the new socket and the 100 Ohm resistor at CR2. Connect to end closest to Q1.

c. Pin 2 of the new socket and RESET pin A.

d. Pin 6 of the new socket and TRAP pin D.

e. Pin 7 of the new socket and the Ground land pattern. (It is the closest land pattern to the pin.)

f. Pin 8 of the new socket and pin 5 of U1. (This is the SID pin)

g. Pin 12 of the new socket and the cathode of the Zener diode installed in area 3 of figure 2.

Step 15.

Using the wire wrap wire make connections between the following points on the board:

a. Pin 4 of U1 and the 12,000 Ohm resistor at R17. Connect to the end farthest from Q1. There is a convenient pad available for this connection left by the removal of R18.

b. The pad connected to the emitter of the transistor at Q1 and a nearby ground land pattern.

Step 16.

Install the 7400 or 74LS00 IC in the new 14 pin socket.

Step 17.

Mount the two normally open pushbuttons at some convenient location. Connect one pushbutton to RESET pins A and B on the top of the board. This is the reset pushbutton. Connect the other pushbutton to TRAP pins C and D on the top side of the board. This is the trap pushbutton.

Step 18.

Double check the modifications against the schematic diagrams in figures 3 and 4. If everything checks out then the change is now complete.

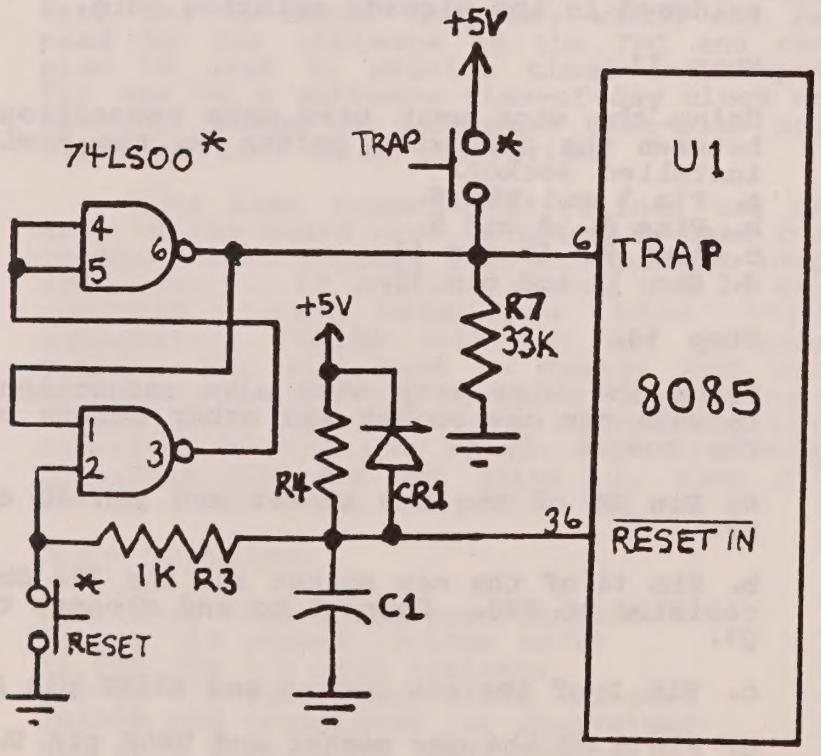


Figure 3.
TRAP and RESET circuit changes.

AC HOOKUP

Take a lead from the secondary of the power transformer and connect it through a resistor to the pad marked 'AC' in figure 2. The value of resistor to be used may be calculated with the following formula:

$$R = 200 (V_{pk} - 5)$$

where V_{pk} is the peak value of the voltage from the transformer. The formula gives the resistance in Ohms.

The resistance value is not at all critical and may be plus or minus 50% from the value given by the formula.

IMPORTANT NOTE: Do not connect to the board without this resistor. Also - do not connect the circuit directly to the AC mains!

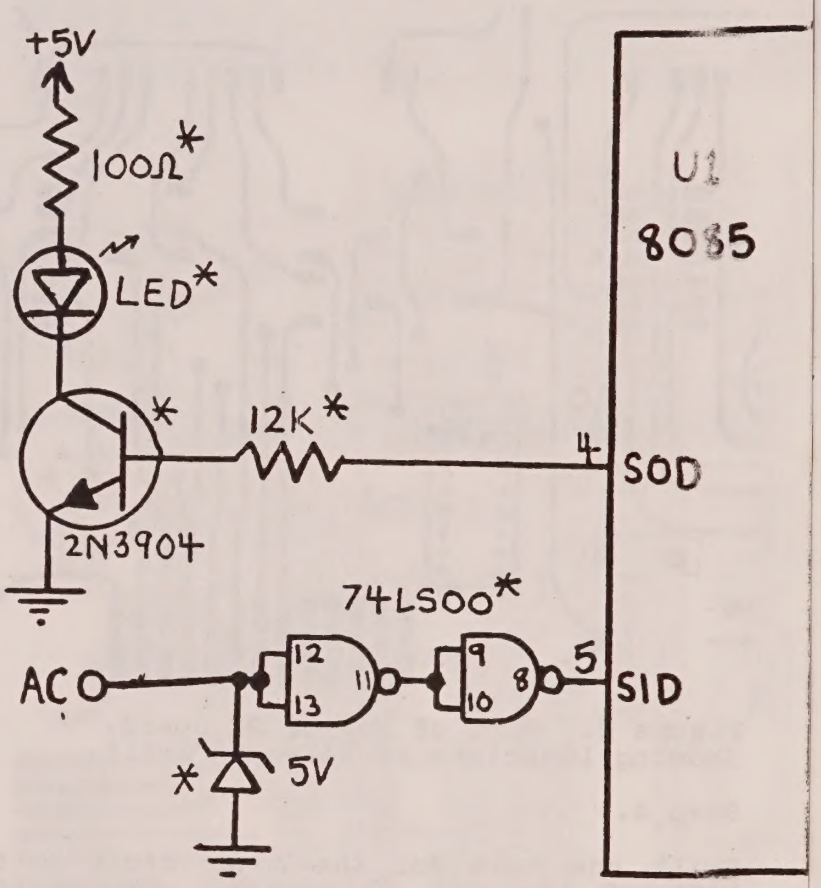
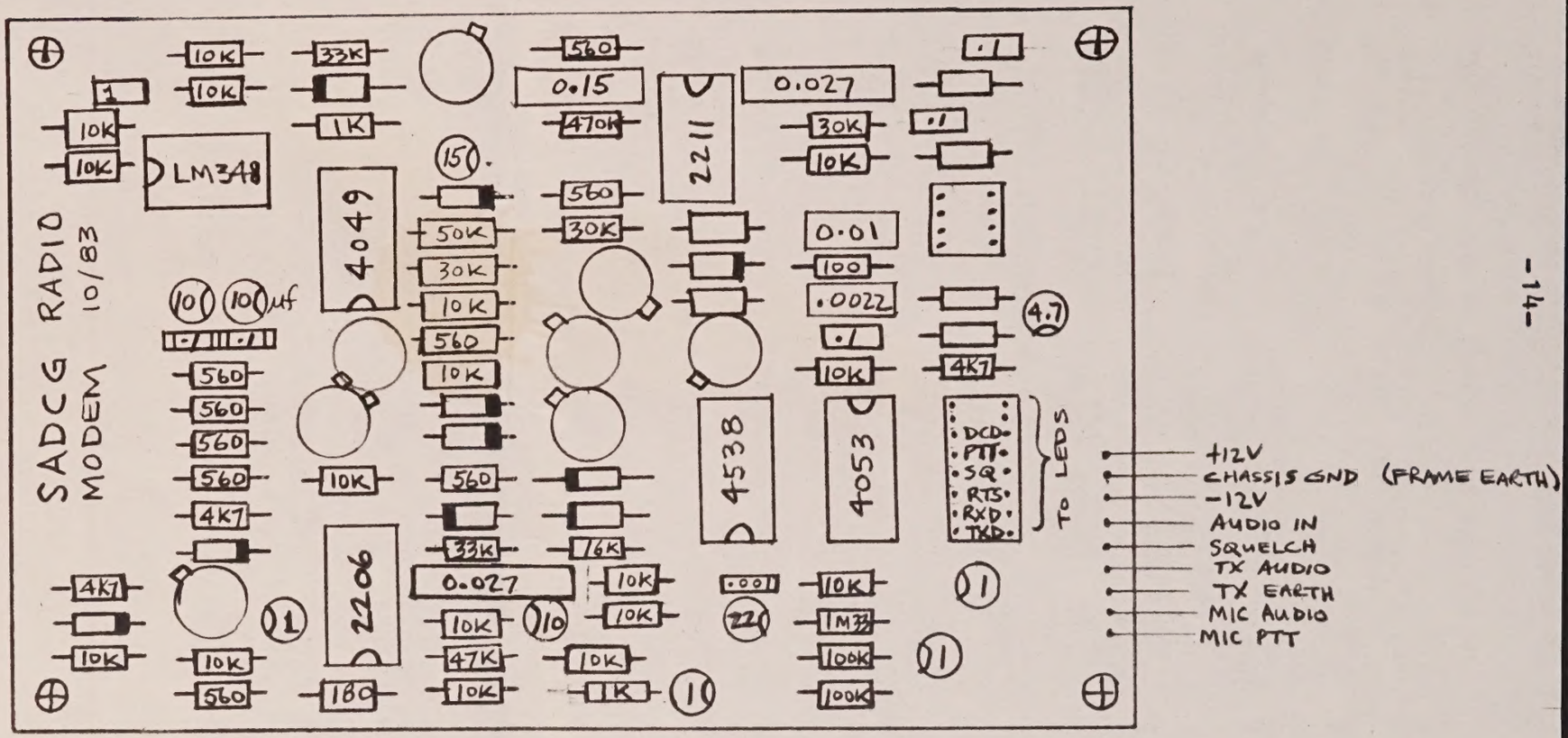


Figure 4.
Indicator LED and timer circuits.

In the next issue of 'the packet' we will show some ways of using these new features and some extremely useful software which relies on these modifications.

The author* would appreciate hearing from anyone using these instructions to modify their VADCG board who has any difficulty understanding them or who finds any errors. I have tried to make the changes as clearly as possible but it is sometimes hard to look at things through other peoples eyes.

* Douglas Lockhart, VE7APU
9531 Odlin Road,
Richmond, B.C. V6X 1E1



SADCG	SYDNEY AMATEUR DIGITAL COMM. GRO
DES. 10/83	1200 BAUD 202-TYPE PACKET RADIO MODEM
	PRELIMINARY - LAYOUT

TNC ADDRESS ASSIGNMENTS IN THE TORONTO/HAMILTON AREA

The following chart shows the TNC address assignments and other information relating to packet stations in the Toronto/Hamilton area as of August 22, 1983.

NO	CALL	TNC	NAME	MODEM	TERM	RIG
01	N2APB	7DH	GEORGE			
02	VE3ATI	33/B3H	BERNIE	VADCG	VCOM1	TR-7950
03	VE2BAR	D7H	MIKE	NCR	LNW-80	XXX
04	VE3BKB	DCH	JON	VADCG	VCOM1	IC-22 S
05	VE3BRZ	EFH	ROB			
06	VE3BZF	E4H	LLOYD	VADCG	TRS-80	IC-22 S
07	VE3CES	E0H	JOHN		TTY	
08	VE3DI	D6H	ALLAN	G.D.C.	TRS-80	IC-22 S
09	VE3DNM	62H	MAX	VE3DVV	TRS-80	IC-22 S
10	VE3DSP	61H	GLENN	VE3DVV	TRS-80	VTR
11	VE3DVV	73H	JOHN	VE3DVV	CPM	IC-22 S
12	VE3EC	ECH	BILL	VE3EC	CPM	IC-22 S
13	VE3EFD	08H	ROB	VE3MWM	CPM	
14	VE3EHL	75H	ED	VADCG	TH-3216	ST-227
15	W2EUP	77H	GILL	GLB		
16	VE3FAO	FAH	FRANK	VE3FAO	LNW-80	AZDEN-3000
17	VE3FGK	DAH	DAVE	NCR	TRS-80	AZDEN-2000
18	VE3FHJ	EDH	TOM	VADCG	APPLE	IC-211
19	VE3FIV	40/C0H	MIKE	VADCG	VCOM1	TR-7950
20	VE3FMG	78H	MIKE	HYBRID	TRS-80	IC-211
21	VE3FXQ	DFH	LARRY	VADCG	PET	IC-22 S
22	VE3GBC	D8H	BRUCE	VADCG	PET	HW-202
23	VE3HDJ	DEH	DICK		IBM	
24	VE3HGC	D3H	ROGER	VADCG	APPLE	IC-22 S
25	VE3HYN	84H	CRAIG			
26	VE3IAC	EEH	PAUL	NCR	LNW-80	HW-2036 A
27	VE3IBH	D5H	JIM	VADCG	APPLE	HW-2036 A
28	VE3IHG	D1H	RON	VADCG	APPLE	IC-22 S
29	VE3IUV	74H	RON	VE3DVV	TRS-80	IC-22 S
30	VE3IXT	85H	JOHN	VADCG		IC-211
31	VE3IYQ	DBH	ED	VADCG	TRS-80	HW-202
32	VE3IZO	D9H	GORD	G.D.C.	APPLE	HW-202
33	VE3JBP	E2H	CHARLIE	VADCG	TRS-80	HW-202
34	VE3KVG	D4H	ROGER	VADCG	APPLE	HW-202
35	VE3LCM	E3H	EARL			
36	VE3LNY	35/B5H	JACK	SANDERS	IBM	IC-22 S
37	VE3MCF	34/B4H	DOUG	VADCG	IBM	AZDEN-2000
38	VE3OBE	C8H	BILL			
39	K2MPE	7CH	AL		TRS-80	
40	VE3MWM	39/B9H	STU	VE3MWM	CPM	TR-2400
41	VE3NEC	D2H	JOHN	VE3NEC	TRS-80	IC-22 S
42	VE3OGY	44/C4H	DOUG	NCR	CPM	IC-22 S
43	VE3PKT	3A/BAH	MAIL	VE3MWM	CPM	ULTRACOM
44	WA2RYT	7AH	RAY		CPM	IC-22 S
45	VE3SP	76H	RON	VADCG	TRS-80	IC-22 S
46	WB2TGU	7BH	TOM		ZX-81	
47	W4UCH	63H	BOB	SOFTWARE		
48	VE3UR	DDH	RAY	VADCG	PET	DRAKE
49	WB2VEU	41/C1H	ANDY	VADCG	VCOM1	TR-7950

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